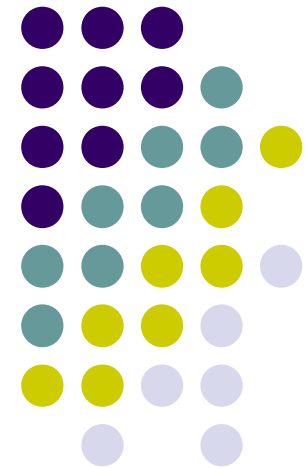


Fedor Tiršel

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# On ontology-based indoor navigation for the visually impaired





# Motivation

- | **unique requirements** on a navigation system for blind or visually impaired users
- | **easy to implement** solution for owners of buildings
- | finding accurate and **reliable user location**
- | avoid the **trial and error** process
- | upgrade user's **familiarity** with an unknown environment



# Requirements I

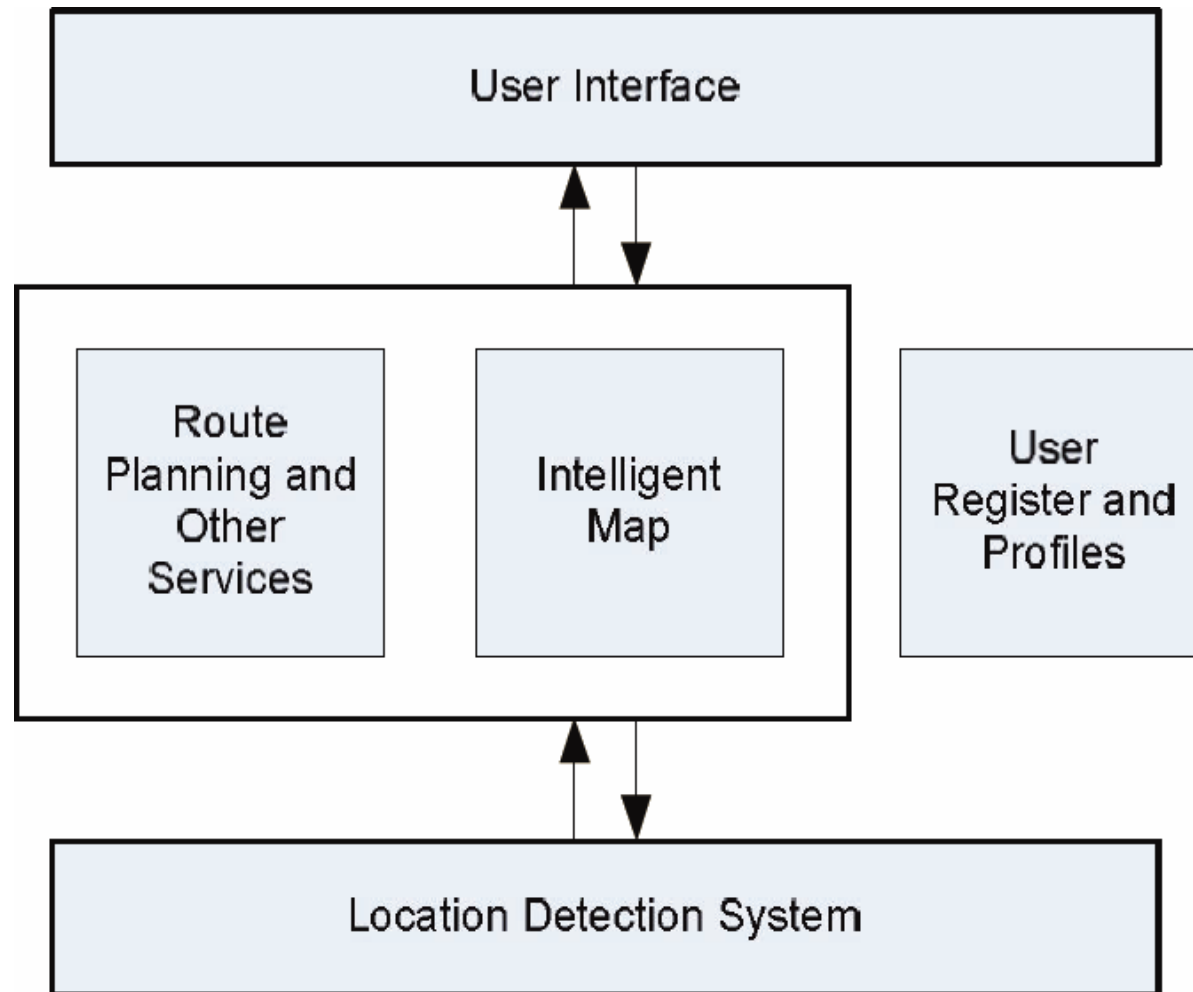
- I **route planning** and management (save, edit, share)
- I adaptive **start to end route** following
- I accurate relative and absolute **progress feedback**
- I up to date **hazard warning** and avoidance guidance
- I general **environment information**



## Requirements II

- | non-blocking of **other senses** (headphones)
- | **voice navigation** on demand
- | graduated **levels of functionality** (novice → expert)
- | **emergency request** for assistance

# Concept





# Ideas

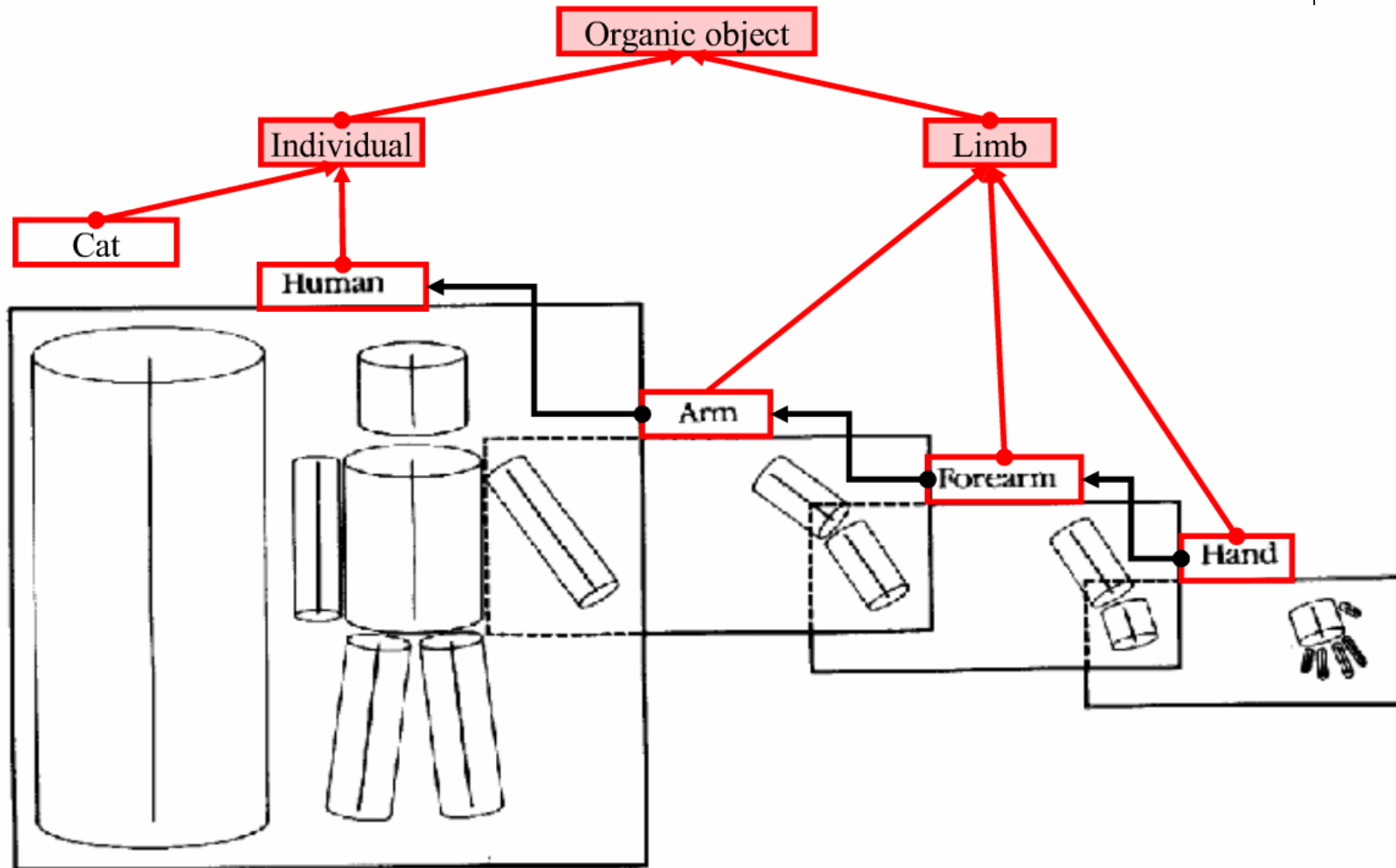
- | adoption of **smart phones** as “the device”
- | absence of **assistive tools** for navigation (e.g. the long cane, guide dogs)
- | **QR** codes for fully sighted, “wireless” for blind
- | routing in **ontology-based maps**



# Ontology I

- | **Def:** a logical theory which gives explicit, partial account of a conceptualization
  
- | **Def:** an intensional semantic structure which encodes the implicit rules constraining the structure of a piece of reality

# Ontology II

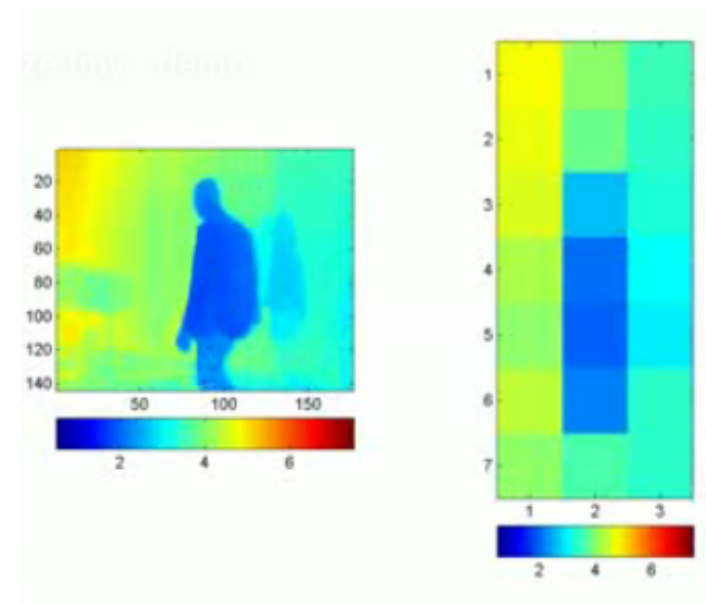




# Special canes – Ven ze tmy



- | **acoustics signals** overlays natural sound of the surroundings
- | information is primary send to the **body skin**
- | information about locale obstacles in front of **whole user body**
- | detection based on stereo and 3D cameras
- | representation of **depth map**





# Special canes – RF Guide

- | concept of intelligent buildings
- | routes are *marked* by **RFID** and magnetic beacons
- | **cheap and available** solution
- | “You are at the second floor. There is door number 210 three meters behind you. Watch: on both sides of the corridor are benches.”





# Summary

- | to provide **assistance on demand**
- | up to date **hazards identification** and level based warnings
- | **sharing** of knowledge
- | **independency** of visually impaired user
- | to build **ontology-based maps**